

## Data

Crankshaft, normal size and repair stages	Crankshaft journal dia.	Thrust bear- ings width of flanged shell bearings	Corresponding thrust washer thickness	Journal width	Crankpin dia.	Crankpin width
Normal size	<u>69.96</u>	<u>33.80</u>	<u>2.15</u>	<u>34.00</u> <sub>1)</sub>	<u>51.96</u>	<u>32.00</u>
	69.96	33.90	2.20	34.03	51.95	32.10
				<u>34.10</u> <sub>1)</sub>		
				34.13		
1st repair stage	<u>69.71</u> 69.70	<u>34.40</u>  34.60 basic	2.25  or  2.35  or  2.40	<u>34.20</u> <sub>1)</sub> 34.23	<u>51.71</u> 51.70	up to 32.30
2nd repair stage	<u>69.46</u> 69.45			or <u>34.40</u> <sub>1)</sub>	<u>51.46</u> 51.45	
3rd repair stage	<u>69.21</u> 69.20			34.43	<u>51.21</u> 51.20	
4th repair stage	<u>68.96</u> 68.95			or <u>34.50</u> <sub>1)</sub> 34.53	<u>50.96</u> 50.95	
Permissible ovality of crankshaft journals and crankpins					0.005	
Permissible conicity of crankshaft journals and crankpins					0.01	
Permissible wobble of thrust bearing					0.02	
Permissible eccentricity of flywheel flange					0.02	
Fillets on crankshaft journals and crankpin					3.0 to 3.5	
Permissible eccentricity of crankshaft journals, mounted at outer journals	Engines 615, 616			Journals II, IV	0.07	
				Journal III	0.10	
	Engine 617			Journals II, V	0.07	
				Journals III, IV	0.10	
Scleroscope hardness of crank- shaft journals and crankpins				as new	74—84	
				tolerance limit	60 <sup>2)</sup>	
Permissible unbalance of crankshaft					15 cmg	

1) Figures when using thrust washers. When using flanged shell bearings: journal width = 34.00—34.60 mm.

2) At least 2/3 of the pin/journal circumference must show tolerance limit.

## Special tool

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Drop hardness tester



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## Note

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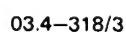
For checking and reconditioning crankshafts proceed in the order of the overleaf diagram.

## Diagram

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\*See section "Explanations to diagram".

V = Discard.



## Explanations to diagram

### Crack check

Clean crankshaft, making sure that pins and journals show no signs of oil or grease.

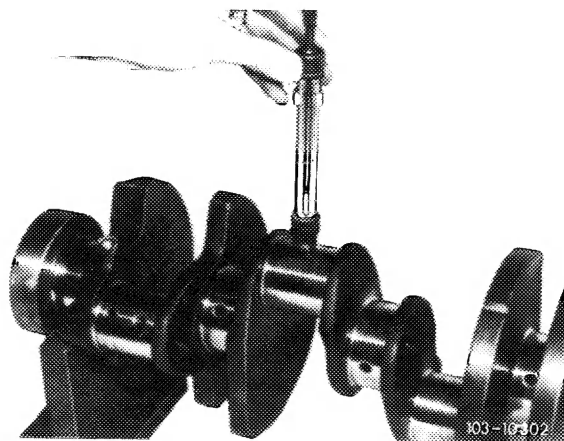
Magnetize crankshaft and apply fluorescent powder (fluxing). It is also possible to employ a paint penetration method (dipping in bath or spraying from can).

Materials: Paint or fluorescent powder,  
cleaning agent,  
developer

### Hardness test

Check hardness using hardness tester (scleroscope hardness).

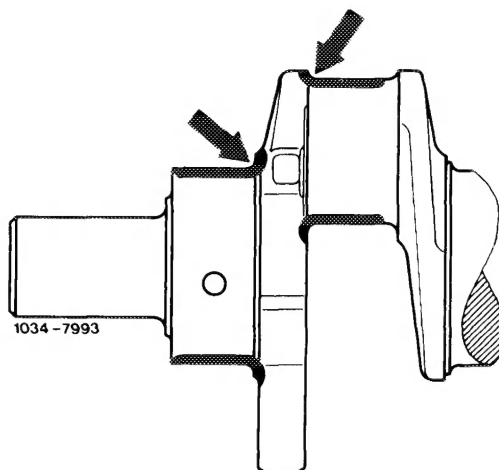
Minimum hardness of 60 must be obtained around 2/3 of pin/journal diameter.



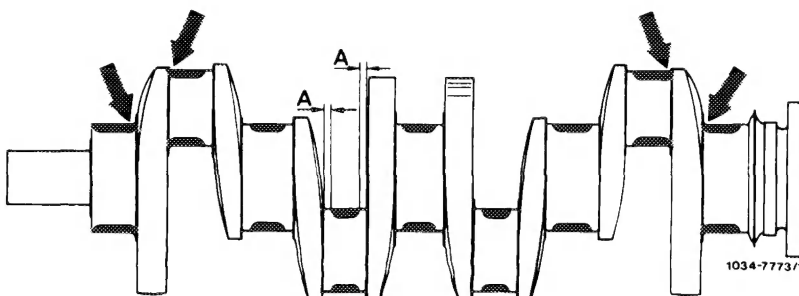
### Hardening

Pins/journals without hardened fillets can be treated by induction or flame-hardening. In contrast, pins/journals with hardened fillets (arrows) must always be hardened by induction.

Failing this, discard crankshaft.



For hardening pins/journals not having hardened fillets, be sure to obtain distance A between fillet and end of hardened section (5–6 mm).



## Checking hardness

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To obtain satisfactory hardness, it is essential to adjust the hardening system by means of microsections.

These sections can be taken from hardening experiments on discarded crankshafts.

Check hardening effect by etching pin/journal surface with a 2 % alcohol solution of nitric acid ( $\text{HNO}_3$ ).

No dark spots must appear on the pin/journal surface.

The unhardened fillets go dark.

In contrast, the hardened fillets must be as light as the pin/journal surfaces.

To compare the effects it is advisable to etch a metallographically checked pin/journal.

Finally wash off the nitric acid carefully with alcohol.

## Corrosion protection

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Crankshafts which are not put back immediately must be lubricated with engine oil (SAE 30 running-in oil).